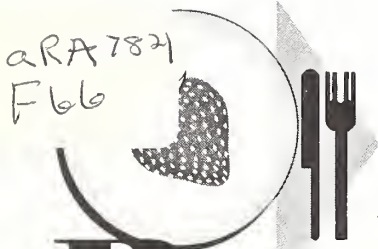


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Food & Nutrition Research Briefs

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Muscadine Grapes: New Health Food?

Scientists with ARS and Mississippi State University have found significant amounts of resveratrol in the skin, pulp, and seeds of muscadine grapes. Resveratrol is the compound in French wines said to lower cholesterol and the risk of coronary heart disease.

In the Southeast, muscadines are grown to make juice. But the researchers are now using muscadine waste from juice processing to make products like muffins, jams and granola cereal. One-half serving (two ounces) of unfiltered muscadine juice, one serving of muscadine jam, one medium muscadine muffin, or one-tenth serving of muscadine sauce give the same dietary amounts of resveratrol as four fluid ounces of red wine, the researchers say. Their report is in the *American Journal of Enology and Viticulture* (vol. 47, pp. 57-61).

Muscadine puree—an excellent source of resveratrol, dietary fiber and some essential minerals—is high in carbohydrates and low in fat and protein. Powdered puree contains more dietary fiber than oat or rice bran. In MSU studies, rats fed the powder had lower LDL (bad) cholesterol and higher HDL (good) levels than animals in the control group.

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Blood Protein Poor Indicator of Hunger

Doctors generally interpret a low level of a blood protein called transferrin to mean a child or elderly person suffers from malnutrition. But new findings from a study of Jamaican children indicate that low transferrin can point to another culprit: infection due to poor sanitation. Inadequate water and sewer sanitation can be a source of intestinal pathogens—viral, bacterial and parasitic. This infection connection can be sneaky. A child will seem healthy until a

repeated, but undiagnosed, infection uses up stored nutrients. Then classic hunger symptoms develop, possibly confounding the pediatrician and parents.

A nutritionist at the ARS-funded center in Houston, Texas, collaborated with researchers from the University of the West Indies to examine infected and severely malnourished children at the university's Tropical Metabolism Research Unit in Kingston, Jamaica. Their finding that infection can lower transferrin—and mislead health workers—is as important for agencies serving America's poor as for those conducting international relief efforts. The findings are published in the *Journal of Nutrition* (vol. 127, pp. 1469-1474).

Scientists have long known that many children worldwide suffer from protein-energy malnutrition, or PEM. They get enough calories to survive, but their diets are low in protein. Infections can tip the nutritional scales against these children. They reduce the children's appetites and "tax" available calories to fight illness, leading to malnutrition.

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Extra Calcium May Require Added Zinc

Consuming extra calcium from dairy products or supplements could put older women at risk of low zinc—unless they get extra zinc, too. That's the indication from two recent studies. In one of the new studies, lasting about 5 weeks, 18 relatively healthy women past menopause increased calcium intake to 1,360 milligrams daily. That's a little higher than the 1,200 mg now recommended for people over age 50. The women's zinc absorption dropped an average 2 mg as did their zinc balance. This happened regardless of whether the extra calcium came from milk or a calcium phosphate supplement. In a second study, zinc absorption dropped by half when a group of 10 men and women took a calcium supplement with a single test meal. But adding nearly 8 mg of zinc to the calcium supplement

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offset this effect. The studies were reported in the *American Journal of Clinical Nutrition* (vol. 65, pp. 1803-09).

Calcium supplement sales have soared with the growing awareness that high intakes of this mineral help prevent osteoporosis. Some studies have found that extra calcium blocks zinc absorption, while others haven't. The researchers looked for a zinc-calcium interaction in elderly women because, as a group, they tend to have low zinc intakes. About half of U.S. women consume less than two-thirds the Recommended Dietary Allowance of 12 mg, according to survey data. And the amount of zinc people absorb from their meals decreases with age.

While the findings need corroboration before recommending that women who take extra calcium also increase their zinc intake, they point in that direction. Zinc's many functions include helping us maintain a healthy immune system, skin and appetite. The richest dietary sources of zinc are oysters, liver and beef, followed by whole wheat products, nuts, popcorn, cheddar cheese, poultry, lamb and pork.

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Why T Cells Slow Down in Elders

Scientists have identified an instigator behind the age-related decline in T cell function, which coordinates the body's response to an infectious agent or a would-be tumor. What's more, they were able to reduce the effects of this instigator in cultured cells. The finding brings science a little closer to defining how people can maintain a healthy immune system well into old age.

The researchers had suspected that prostaglandin E2 (PGE2) might contribute to the decline of T cell function in seniors because too much of this inflammation-producing substance has been shown to suppress T cell activity. Their suspicions were confirmed when they compared white blood cells from old and young mice, as reported in *Mechanisms of Aging and Development* (vol. 93, pp. 59-77).

Macrophages from the old mice indeed produced more PGE2, which reduced T cell function. While it's not the only culprit, it appears to be an important one, the researchers say. They also demonstrated that excess PGE2 was due to increased levels and activity of the enzyme cyclooxygenase, needed to produce PGE2. That finding is reported in the *Journal of Immunology* (vol. 159, pp. 2445-51). Adding the antioxidant vitamin E to the cell cultures reduced PGE2 levels and improved T cell function. This suggests that people might slow dysfunction of the immune system as they age by increasing body levels of vitamin E and possibly other nutrients.

The researchers speculate that excess PGE2 also may contribute to cancer, cardiovascular disease, arthritis and other diseases of aging because the fatty substance is found in new tumors as well as in inflamed tissues, including artery walls.

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Navaho Blackberries Stay Fresh for Weeks

Blackberries are a 90's-type of food. They're rich in fiber and ellagic acid, a substance recently in the news for its possible anti-cancer properties. But it's hard to find fresh blackberries without camping out in the produce section. That may soon change, due in part to the recent discovery that Navaho, a thornless blackberry variety, has a shelf life of 14 to 21 days compared with the typical 3- to 4-day shelf life of other varieties. Short shelf life is the reason for the scarcity of fresh blackberries, even though acreage devoted to blackberries has been expanding, especially in the South.

Navaho was bred at the University of Arkansas at Fayetteville and released in 1988 as the first thornless erect blackberry. But the discovery of its unusual staying power is more recent, the result of post-harvest research by ARS scientists in Oklahoma. The blackberries maintained their freshness for up to 3 weeks when stored in industrial coolers. Also, a test shipment of the berries arrived in the Netherlands just as they were picked: firm, exceptionally sweet and consistently tasty. This test, reported in *HortScience* (vol. 31, pp. 258-261), included a 4-hour refrigerated shipment from an Oklahoma farm to Dallas/Fort Worth International Airport in Texas and a 2-day air shipment with dry ice.

For more information, contact Penelope Perkins-Veazie, (405) 889-7395, South Central Agricultural Research Laboratory, Lane, OK; pperkins@ag.gov

Animal Urine—New Source of Medicine?

Animal urine has the potential to become a new source of valuable hormones and other human drugs, thanks to the collaboration of ARS and New York University researchers. They have developed transgenic mice that produce, in the lining of their bladders, human growth hormones that accumulate in the urine. This model system, the scientists say, shows that the approach could be used in larger animals that produce more urine. It has the potential to be more economical than mammary gland "pharming"—the current practice of producing pharmaceuticals in the milk of transgenic animals.

That's because it takes two to three years before the female of most farm animal species reaches sexual maturity, breeds and lactates for the first time. By contrast, it would be possible to collect urine from livestock about a day or two after the animals are born. Another advantage: urine can be taken from both males and females. Currently, several pharmaceuticals are being experimentally produced in the milk of transgenic livestock.

The researchers stress that the findings are preliminary and that there are drawbacks. For one, the bladder produces a much lower concentration of drugs than does the mammary gland. But the low concentration should not pose a major problem because purification from urine should be less costly. Reported in the January 1998 issue of *Nature Biotechnology* (vol. 16, pp. 21-27), the success demonstrates that the approach is feasible, but more research is needed to perfect the system.

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New Clue to Prevent Hunger Mortality

Prolonged hunger in infants may suppress part of the genetic coding for lactase—the enzyme that digests the milk sugar lactose. That's from a study of 29 infants recovering from malnutrition at a clinic at the University of Sao Paulo, Brazil. This may explain a tragic medical mystery that some pediatricians call "paradoxical re-feeding response." While most starving children and infants respond well to international treatment efforts, 10 to 20 percent get sicker and die. If validated by further studies, this finding could generate discussion among physicians on the value of lactose-free treatments when others don't succeed.

The study infants had not responded well to re-feeding formulas, but intestinal biopsies ruled out diseases that might have affected recovery. Researchers compared tissue samples from the malnourished infants to those of 10 well-fed infants hospitalized for a life-saving surgery that required removal of some intestinal tissue.

This hunger-related intolerance appears to be fundamentally different from genetically inherited lactose intolerance, the researchers report in *Gastroenterology* (vol. 112, pp. 742-751). Unlike adult lactose intolerance, this condition is temporary. It abates after the child receives adequate nutrition. Lactose can come in many forms—from human breast milk to some nations' international food-relief products. USDA's Farm Service Agency provides lactose-free corn-soy or wheat-soy blends for U.S. relief efforts overseas.

For more information, contact Buford Nichols, (713) 798-7018, *Children Nutrition Research Center*, Houston, TX; bnichols@bcm.tmc.edu.

Gold in Them Thar Hulls

From a corn kernel hull, ARS scientists have discovered and applied for patents on two new products: "Amazing oil," a corn fiber oil that may lower cholesterol, and "Zeagen," a valuable white corn fiber gum. The patent for the corn fiber oil will be jointly held by ARS and the University of Massachusetts, where feeding studies with hamsters indicated that the oil significantly lowered total serum cholesterol and LDL cholesterol—the kind that clogs arteries.

Monsanto, St. Louis, Mo., has licensed the oil technology and plans to develop a variety of foods and food ingredients aimed at lowering cholesterol. The gum is extracted in the form of a smooth, white powder, bland in flavor and aroma, that could be used in foods as an emulsifier, a soluble dietary fiber or a thickener. The National Starch and Chemical Co., Bridgewater, N.J., is working with ARS to further develop the gum, which also has potential industrial applications.

Corn fiber is a low-value byproduct of wet milling, the industrial process that produces starch, sweeteners, fuel grade ethanol and other products from corn. About 4 million tons of fiber—which could yield about 80,000 tons of corn fiber oil—are produced by the corn processing industry each year. This waste byproduct is now sold for about 5 cents a pound as a low-cost ingredient in livestock feed. Commercializing these new products could also lower production costs for fuel ethanol and other corn-derived products.

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Nationwide Hunt For Chicken Microbes

ARS scientists have begun a nationwide bacteria hunt to learn where chicken pathogens can get their start at the farm, so they can be stopped before reaching consumers. The year-long study is sampling farms in each of the nation's top poultry-producing areas—Arkansas, California, Georgia, Mississippi and the Delmarva peninsula of Delaware, Maryland and Virginia.

The scientists are focusing on 10 broiler production farms. On each farm, they are taking samples from 25 places to find out which places are likely to transmit food pathogens. Feed bins, hatcheries and even farmers' boot soles are being sampled. DNA tests will distinguish the bacteria present in each of the 25 sample sites. The scientists will piece together this information to determine which sites are top candidates for extra contamination control.

The survey could provide a national picture of where and possibly how poultry contamination may begin. It could also supply poultry producers with a new way to track and control bacterial risks. Five top poultry producers have invited the scientists to comb their farms for this project, the largest of its kind in the United States.

Salmonella and Campylobacter bacteria are two of the worst poultry food-safety concerns. They can enter the food supply at any time—in the farm hatchery or the consumer's kitchens. Studies indicated Salmonella may infect 25 percent of processed poultry carcasses; Campylobacter may infect up to 90 percent. Proper cooking and handling is the best protection.

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Clear Vision Calls For Years of Vitamin C

New findings from a study of 247 women confirm that long-term use of vitamin C supplements substantially reduces the risk of cataract—a clouding of the eye's lens. There were 77 percent fewer early-stage cataracts among the women who took the supplements daily for more than 10 years than among those who didn't supplement. Women who took the supplements for less than a decade had no detectable difference in cataract prevalence, according to researchers at the ARS-funded center in Boston, MA, and colleagues with the Harvard University Nurses Health Study. Cataracts are thought to result from oxidation of lens proteins, and vitamin C prevents oxidation, the researchers say.

The findings corroborate a 1992 report that linked 10-plus years of vitamin C supplements with far fewer cataract surgeries among nurses in the larger Harvard study. And they emphasize that cataracts are a chronic condition that takes many years to develop and therefore requires a long-term solution, the researchers concluded in the *American Journal of Clinical Nutrition* (vol. 66, pp. 911-916).

Participants from the 21-year-old Nurses Health Study were selected for this study based on high and low vitamin C intakes. The supplement users took at least 500 milligrams of vitamin C daily in addition to food and multivitamin sources. None of the women had been previously diagnosed with the condition, and each had reported her food and supplement intake several times before being examined for cataracts.

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Kids' Diets Get Closer Look

During this year, interviewers under contract to the ARS will visit the households of about 5,000 infants and young children across the United States to gather data on the foods they eat. This children's survey is an extension of the 1994-96 nationwide food survey, "What We Eat In America," which covered all age groups. The new survey will cover children up to 10 years old. Interviewers will collect two days of food intake data as they did during the 1994-96 survey in more than 60 areas around the country.

The information will be combined with food intake data collected during the larger survey from about 5,700 children up to age 18. The combined data will provide the Environmental Protection Agency with enough information on children's food intakes for adequately estimating their exposure to dietary pesticide residues, as required by the 1996 Food Quality Protection Act. It will also be useful to planners of other programs that deal with children's needs, such as food assistance and nutrition education.

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